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TO: California Building Standards Commission
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Attention: Thomas L. Morrison, Deputy Executive Director

FROM: Bart E. Croes, P.E.
Chief, Research Division

DATE: May 12, 2008

SUBJECT: COMMENTS ON BSC 02/07 - CALIFORNIA GREEN BUILDING STANDARDS CODE, PART 11, TITLE 24 (EXPRESS TERMS)

I am writing to transmit the comments of the California Air Resources Board staff on the proposed California Green Building Standards. We fully support the efforts of the California Building Standards Commission and the Department of Housing and Community Development to improve the energy efficient design of California's buildings, assure healthy indoor air quality, and reduce emissions of greenhouse gases.

Our specific comments on the draft California Green Building Standards are provided in the attachment. Our recommended changes are intended to incorporate current best practices and new state regulations that protect indoor and outdoor air quality and that help mitigate climate change.

Thank you for the opportunity to comment on these draft standards. If you have any questions or need further information, please contact Linda Smith, Chief, Health and Exposure Assessment Branch, at (916) 327-8225, or lsmith@arb.ca.gov.

Attachment

cc: Linda Smith, Chief
Health and Exposure Assessment Branch
Research Division

ATTACHMENT

ARB Comments on CBSC/HCD Draft Green Building Standards,

BSC 02/07, 45-day Language, Combined Version

May 12, 2008

1. Sec. 503.1, Energy performance. ARB staff recommends CBSC/HCD adopt provision "503.1.1 Tier 1, Exceed 2007 California Energy Code Requirements by 15%," as a required provision, not optional. A threshold to exceed the Title 24 Energy Code requirements by 15% is achievable and critical to reducing greenhouse gas (GHG) emissions and achieving California's climate change goals.

   This is also consistent with the minimum prerequisite for participating in the United States Green Building Council (USGBC) Leadership in Energy and Environmental Design Rating System for New Construction (LEED-NC). To meet this prerequisite, a project must exceed minimum energy code requirements by at least 14% for new buildings and 7% for existing building renovations.

2. Sec. 503.2, Minimum energy performance for low-rise residential buildings. ARB staff recommends that CBSC/HCD include a provision in Section 503.2 that requires similar Tier 1 and Tier 2 levels for energy performance as in Section 503.1, and that provides guidance for how energy performance is to be calculated, as was done for Sec. 503.1. ARB staff also recommends CBSC/HCD adopt Tier 1 to exceed Title 24 by 15% as a required provision for low-rise residential, not as an option.

   Exceeding the Title 24 Energy Code by 15% is the mid-range threshold for achieving certification through the Build It Green GreenPoint Rated program designed for new residential green buildings. Many cities in California have either adopted or are considering mandating GreenPoint Rated for all new residential construction.

3. Sec. 504.4, Commissioning. This section focuses on HVAC and other major energy-using systems. We recommend also including at least a checklist to help verify that the other key features for sustainability are included in the design, construction, and operations and maintenance plan, e.g., for low emission materials and finishes, filters, and moisture control.

4. Sec. 511.1, On-site renewable energy. For both residential and non-residential, we recommend considering a minimum requirement to pre-wire for future photovoltaic (PV) installation. This is a cost-effective strategy to increase renewable energy production in homes. The Build It Green GreenPoint Rated residential green building program identifies this as a strategy for certification. Pre-wiring new homes for future renewable energy generation will also assist in achieving the California Solar Initiative.

5. Sec. 603.1, Meters; Sec. 603.2, 20% Savings; Sec. 603.3, Appliances. For both residential and non-residential, we recommend adoption of 603.2 and 603.3 as required provisions, not optional. Installation of water efficient fixtures and appliances is an important strategy to conserve water, which decreases GHG emissions by limiting the need to pump and treat water.

6. Sec. 708.3, Construction Waste. We recommend that this provision be required, not optional. The infrastructure for construction and demolition waste management is widely available, and a 50% recycling rate is achievable. This mandatory provision would help the state to achieve GHG reduction goals.

   An added optional provision could include language to "recycle and/or salvage for reuse a minimum of 75% of non-hazardous construction and demolition debris."

7. Sec. 802.1, VOC definition. To be consistent with ARB and local air district regulations for consumer products and architectural coatings, use the following ARB definitions of VOCs:

   - Volatile Organic Compounds as defined in Title 17, Sec. 94508(a).
   - Low Vapor Pressure-VOCs as defined in Title 17, Sec. 94508(a).
   - Reactive Organic Compounds as defined in Title 17, Sec. 94521.

   The approved method for measuring these compounds is described by CARB Method 310.[1]

8. Sec.. 803.1, Fireplaces. We suggest excluding wood burning heating appliances unless propane or natural gas are not available. Wood burning is less efficient compared to burning natural gas in sealed-combustion fireplaces, it produces more indoor air pollution, and produces much more outdoor air pollution (by several orders of magnitude).

9. Sec. 804.1.3.5, Additional Indoor Air Quality (IAQ) Measures, duct cleaning. Manufacturing oil residue on the duct interior enhances the growth of mold and bacteria on the duct interior surface. The oil residue cannot be easily removed by conventional duct cleaning methods using a rotating brush, so the residue should be removed while the duct work is still disassembled and easily accessible. We recommend replacing this section with language from the requirement in the 2006 CHPS Best Practices Manual, as follows:

   "Duct cleaning: Oil film on sheet metal should be removed before shipment to site. On-site, inspect ducts to confirm that no oil film is present. Remove any oil. If

[1] ARB, 2005. Method 310, Section 1.1. http://www.arb.ca.gov/testmeth/cptm/cptm.htm.

ducts contain dust and dirt, clean them immediately, prior to substantial completion and prior to using the ducts to circulate air." [2]

10. Sec. 804.2(1) and 804.2(2), IAQ post-construction ventilation before occupancy. It is not clear how the requirement for 14,000 cubic feet of outdoor air per square foot of floor area equates to typical settings on outdoor air dampers or to air exchange rates and air flow rates. Without specifying the time units for the volume of outdoor air to be delivered, the air flow rate could be so low as to achieve very little air mixing and, hence, much less effective pollutant removal.

    We recommend using a requirement that is simple and easier to verify, i.e. the prerequisite used in the 2006 CHPS Best Practices Manual, with a deletion of the maximum temperature value in CHPS, as follows:

    "*Building flush-out*: Flushing out the building with 100% outside air will help remove indoor pollutants prior to occupancy. After construction ends, and with all interior finishes installed, flush-out the building by supplying continuous ventilation with all air handling units at their maximum outdoor air rate for at least 14 days while maintaining an internal temperature of at least 60°F, and relative humidity no higher than 60%. Occupancy may start after 7 days, provided *flush-out* continues for the full 14 days. Do not "bake out" the building by increasing the temperature of the space. (If continuous ventilation is not possible, flush-out must total the equivalent of 14 days of maximum outdoor air.)." [3]

11. Sec. 804.3, Covering duct openings and protecting mechanical system during construction. We recommend that this section be adopted by both SBSC and HCD.

    In addition, we recommend adding a subsection to specify that duct work, air handlers, and other components that contact the supply and return air be sealed during transport and storage to avoid accumulation of dust and debris. These components are often stored outdoors for extended periods, and they need to be kept clean.

12. Sec. 804.4, Finish material pollutant control. We recommend that this section be required upon adoption of this code, rather than voluntary, because it incorporates existing state regulations for sealants, adhesives, paints, and coatings, and because low-emission carpet systems, thermal insulation, and acoustical panels are now widely available at competitive prices.

13. Sec. 804.4.1, Adhesives and Sealants. VOC limits are listed here for adhesives, but not for sealants. It appears that the VOC limits for adhesives in Table 804.1.1 are based on the South Coast Air Quality Management District (SCAQMD) standards for adhesives. However, the SCAQMD Rule 1168 includes VOC limits for sealants,

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[2] Collaborative for High Performance Schools (CHPS), 2006. Best Practices Manual, Vol. III – Criteria. EQ2.0.P13. http://chps.net/manual/index.htm#vol3.

[3] Op. cit., EQ2.0.P14.

sealant primers, specialty applications adhesives and substrate specific applications adhesives. This section and the Table should cite SCAQMD Rule 1168; you should also list the VOC limits for sealants in the table, or preferably cite the Rule and delete the table.

In addition, ARB has adopted statewide limits for smaller size adhesives, and sealant or caulking compounds, and both ARB and SCAQMD have adopted regulations that prohibit the use of toxic compounds in adhesives and sealants. SCAQMD prohibits chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene. ARB's consumer product regulations currently prohibit methylene chloride, perchloroethylene, and trichloroethylene in aerosol adhesives and contact adhesives; these also will be prohibited beginning 12/31/08 in construction, panel and floor covering adhesives. In its June 2008 rulemaking, ARB has proposed to ban methylene chloride, perchloroethylene, and trichloroethylene by 12/31/2010 in sealant or caulking compounds.

Local district limits can not supercede the statewide limits. We recommend the following changes to the wording in this section:

"804.4.1, …
1. Adhesives, adhesive bonding primers, adhesive primers, sealants and sealant primers shall comply with SCAQMD Rule 1168 VOC limits, as shown in Table 804.4.1, and the Rule 1168 prohibition on use of certain toxic compounds, except as specified in subsections 2,3, and 4 below.
2. Adhesives and sealant or caulking compounds in smaller unit sizes (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall meet the requirements of California Code of Regulations, Title 17, commencing with Section 94507, http://ccr.oal.ca.gov/.
3 . Aerosol adhesives shall meet the requirements of California Code of Regulations, Title 17, commencing with Section 94507, http://ccr.oal.ca.gov/.
4. Adhesives and sealants shall comply with the current requirements of California Code of Regulations, Title 17, commencing with Section 94509, http://ccr.oal.ca.gov, which prohibits the use of certain toxic compounds."

14. Sec. 804.4.2, Paints and coatings. We recommend that Table 804.4.2 be replaced with Table 1 of ARB's Architectural Coatings Suggested Control Measure.[4] ARB approved this Measure in October 2007, and the Measure is scheduled to be adopted by several air districts over the coming year.

15. Sec. 804.4.3.2, Carpet Adhesive. Replace current language "All carpet adhesive shall meet the requirements of Section 804.1.1 *(there is a typo here*) VOC limit of 50 grams per liter (less water and less exempt compounds)." with "Carpet adhesive shall meet the requirements of section 804.4.1."

[4] ARB, 2008. Suggested Control Measure for Architectural Coatings. February 1, 2008. http://www.arb.ca.gov/coatings/arch/Approved_2007_SCM.pdf.

16. Sec. 804.4.4, Composite Wood Products. The Office of Administrative Law has approved our Airborne Toxic Control Measure (ATCM) for composite wood. Therefore, we recommend changing the wording of this section to cite the ARB regulation as follows:

    "…shall meet the requirements for formaldehyde emissions, as defined in CCR, Title 17, § 93120 to 93120.12, by the dates specified in those sections, and as shown in Table 804.4 below." [5]

    The ARB regulation should also be cited in a footnote to the table, to make the table self-explanatory.

17. Sec. 804.4.4.1, Composite wood products, Early compliance for non-residential products. We recommend including an early compliance provision for residential uses as well. The residential environment is the predominant location for the general public's greatest exposure to formaldehyde in the air.

    In addition, edit this section to read "…where complying product is readily available…". If this is made to be an immediate requirement, then builders may be required to use the products with the "Japanese F☆☆☆☆" rating, which are technically "Phase 2-compliant." [6] These products are currently being sold to Japan, and cost could be a factor.

18. Sec. 804.4.4.2, Agrifiber products. We recommend deleting this provision. It could put agrifiber products at a competitive disadvantage. Agrifiber products are included under our ATCM if they meet the definition of hardwood plywood, particleboard or medium density fiberboard, so it would be preferable to have them meet the performance standards of the ATCM. Also, provisions of the ATCM provide incentives for the use of no added formaldehyde (NAF) resins and ultra-low emitting formaldehyde resins. Methyl diisocyanate, an NAF resin, is currently most often used for agrifiber products. There are some recent innovations with UF resin technology which result in formaldehyde levels similar to NAF resins, and these should be allowed in the future.

19. Sec. 804.4.4.3, Adhesives. We recommend deleting this provision. Adhesives are covered by our composite wood ATCM and this provision appears to contradict the use of the ATCM (and the provisions of Table 804.4.4), since resins are the glues that keep the wood components together. Under our ATCM, parts of the product and the product as a whole must meet our emission limits, so adhesives that are part of the final product would be subject to the limits in Table 804.4.4. Additionally,

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[5] ARB, 2008. Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood. http://www.arb.ca.gov/regact/2007/compwood07/compwood07.htm.

[6] ARB, 2007. Staff Report: Initial Statement of Reasons. Proposed Airborne Toxic Control Measure to Reduce Formaldehyde Emissions From Composite Wood Products, Appendix H: Comparison of the Proposed Phase 1 and Phase 2 Standards to Selected International Standards. http://www.arb.ca.gov/regact/2007/compwood07/compwood07.htm.

this provision could stifle further advances in UF resin technology, which currently uses formaldehyde scavengers called “catchers’ that result in ultra-low emitting formaldehyde resin systems.

20. Sec. 804.4.4.4, Documentation. We suggest the following edits: “Verification of compliance with this section shall be provided as requested by the enforcing agency in accordance with applicable laws. Documentation shall include at least one of the following:

    1. Product certifications and specifications.
    2. Chain of custody certifications.
    3. Other methods acceptable to the enforcing agency.”

21. Sec. 804.6.2, optional prohibition of HCFCs and Halons. The use of HCFCS for HVAC and cooling equipment and the use of halons for fire suppression equipment should be prohibited because there are cost-effective alternatives that are environmentally acceptable. We recommend removing “optionally” from the wording in Sec. 804.6, and removing the Exception for small equipment.

22. Section 806.1, Outside air delivery. Natural ventilation often fails to meet ventilation and thermal comfort requirements, especially in the inland areas of California. It will not be allowed as the source of outdoor air ventilation in the 2008 Title 24 residential standards. We recommend adding a section for nonresidential buildings to require that natural ventilation “systems” be engineered to achieve the IAQ and thermal comfort goals. This should be a requirement rather than an option, in order to provide some assurance of adequate ventilation.

    We suggest using modified wording from 2006 CHPS EQ 2.0 P1 specifications, e.g.: “Naturally ventilated spaces that lack a mechanical supply of outdoor air must meet the requirements of both of ASHRAE Standard 62.1-2004, §5.2 and California Title 24, Part 6, §121(b)(1). They must also include a low-noise exhaust fan through the roof to assist convective air movement, and to provide back up ventilation when indoor pollutant episodes occur. Natural ventilation systems must be engineered to demonstrate sufficient outdoor air ventilation and thermal comfort.”

23. Sec. 806.2, Indoor Air Quality and Exhaust, Carbon Dioxide (CO_2) Monitoring. The wording is vague and could imply that such monitoring systems are required in all buildings. We recommend that you either delete this redundant section, or clarify the wording to be consistent with 2008 Title 24 Section 121(c) 3. The new Title 24 standards were adopted by the CEC in April 2008, and will be effective in mid-2009. The new Title 24 standards for Demand Control Ventilation (DCV) do not allow a CO_2 monitoring system in some occupancies such as classrooms, but allow it in other occupancies such as heath care settings. Concerns have been raised about requiring DCV systems because their reliability has not been adequately demonstrated, they require regular testing and maintenance, and they may lead to poor indoor air quality if not properly used or maintained.

24. Sec 806.3, Bathroom exhaust fans. Delete the exception for homes with whole house ventilation systems. Some of these systems do not draw exhaust air from bathrooms, so spot ventilation would still be needed in high-moisture and kitchen areas.

    In addition, "whole-house ventilation system" is not defined. It needs to be defined as one compliant with 2008 Title 24, Sec. 150(o).

25. Sec. 806.3.1, exhaust fan compliance with ASHRAE 62.2, Section 5. This requirement is redundant with 2008 Title 24. It should be deleted; Title 24 takes precedence in California.

26. Sec. 806.4, Filters. We recommend filters with a rating of MERV 8 or higher, using filters with low pressure drop to avoid energy penalties. This requirement would be especially beneficial in locations near busy roadways and other major sources of outdoor air pollution.

    We also recommend including specifications to prevent common problems with HVAC filter performance:

    1) the edge of the air filter must seal tightly against the gasket in the filter rack and no gap should be visible along the filter edge; and

    2) the filter must be "readily accessible" for routine maintenance. ASHRAE 62.1 defines "readily accessible" as "capable of being reached quickly for operation without requiring those for whom ready access is required to climb over or remove obstacles or to resort to portable ladders, chairs, or other climbing aids." [7]

27. Sec. 807.5, Acoustical Control. A major environmental quality problem in classrooms, especially portable classrooms, is poor acoustical quality. We recommend including the 2006 CHPS prerequisite for classrooms: 45 dBA noise level and 0.6 second reverberation time.[8] CHPS Scorecard points are provided for classrooms with lower noise levels. We also recommend encouraging designers to achieve these lower noise levels.

28. Appendix A, A406.1.5, Commentary of Additional Design Considerations, Fuel efficient vehicles. This section should be included in the main body of the standards because motor vehicle emissions are a major contributor to emissions of air pollutants and green house gases. Because these proposed standards are voluntary, conflict with local codes and ordinances should not be an issue. If local codes and ordinances are more stringent, then wording to ensure compliance with those should be added.

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[7] ASHRAE, 2004. ANSI/ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality. Atlanta, GA.

[8] CHPS, 2006. Op cit. EQ3.0: Minimum Acoustical Performance.

"Low-emitting vehicles" should be clearly defined. We recommend using the vehicle categories listed below. The first 4 categories are defined and regulated under California Code of Regulations, Title 13, Sections 1961 and 1962, and HSC 43800. U.S. EPA defines and regulates fuel efficiency (Category 5). Definitions and current information on low-emission vehicles are also available at the State's Drive Clean website.[9]

1. Zero Emission Vehicle (ZEV). These do not directly produce smog-forming pollutants.
2. Partial Zero Emission Vehicle (PZEV). These produce very low amounts of smog-forming pollutants.
3. Alternate Technology PZEV (AT PZEV). These produce very low amounts of smog-forming pollutants, and have additional "ZEV-like" characteristics.
4. Compressed Natural Gas fueled (CNG); Original Equipment Manufacturer (OEM) only. Exclude non-OEM retrofits because there is currently no emission certification program for these.
5. High Efficiency Vehicle. These are vehicles that qualify for the Single-Occupant Vehicle car pool lane stickers that DMV issues for $8.

In addition, Table A406.1.5.1 shows that the number of parking spaces for preferred parking is about 8%, especially for the categories with higher numbers of parking spaces. We recommend making the value at least 10%, because this would be consistent with combining the two 5% targets for low-emission and car pool vehicles in LEED.

[9] Drive Clean, 2008. Frequently Asked Questions. http://www.driveclean.ca.gov/en/gv/faq/index.asp#2.